AMENDMENTS TO THE CLAIMS

1. (Cancelled).

2. (Cancelled).

3. (Cancelled).

4. (Cancelled).

5. (Cancelled).

6. (Original) A joint detection reception method, which is utilized irrespective of a length of an orthogonal code in a TD (Time Division) - CDMA (Code Division Multiple Access) communication system, to create a system matrix associated with a joint detection receiver in a same time slot of the TD-CDMA mobile communication system, the method comprising the steps of:

a) performing repetition of all channelization codes created from different bursts until a length of individual channelization code blocks is equal to one of a maximum spreading factor and a predetermined value, and creating channelization code blocks having the same lengths;

b) partitioning the channelization code blocks having same lengths into at least one sub-block in order to create channelization code blocks constructed in terms of minimum spreading factors of individual spreading factor sets;

c) performing a convolution operation between at least one partitioned sub-block and a radio channel impulse response, and creating combined impulse responses;

d) grouping the combined impulse responses into combined impulse response sub-block matrices, arranging the combined impulse response sub-block matrices each to be downshifted by an integer times a predetermined offset value, and constructing joint detection sub-block matrices; and

e) arranging individual joint detection sub-block matrices to be downshifted by an integer times the maximum spreading factor, and constructing a joint detection system matrix.

7. (Original) The method as set forth in claim 6, wherein the time slot comprises at least one area selected from a plurality of areas, a midamble area, and a GP (Guard Period) area located between prescribed time slots contained in an allocated wireless frame.

8. (Original) The method as set forth in claim 6, further comprising the step of:

f) performing addition of sub-block columns of the system matrix until the joint detection system matrix is converted into a one block-circulant squared matrix.

9. (Original) The method as set forth in claim 8, further comprising the step of:

g) adding a predetermined value to a lower end position of a received signal vector corresponding to the block circulant squared matrix in order to provide a predetermined length equal to that of a column of the block-circulant squared matrix.

10. (Original) The method as set forth in claim 8, further comprising the step of:

h) applying a block FFT/DFT (Fast Fourier Transform / Discrete Fourier Transform) algorithm to the block-circulant squared matrix to acquire a solution of the block-circulant squared matrix.

11. (Original) The method as set forth in claim 8, further comprising the step of:

i) creating an estimated data vector associated with a joint detection element having different spreading factors by performing repetition of predetermined estimation data.

12. (Original) A joint detection reception method, which is utilized irrespective of a length of an orthogonal code in a TD (Time Division) - CDMA (Code Division Multiple Access) communication system, to create a system matrix associated with a joint detection receiver in a same time slot of the TD-CDMA mobile communication system, the method comprising the steps of:

a) performing repetition of all channelization codes created from different bursts until a length of individual channelization code blocks is equal to one of a maximum spreading factor and a predetermined value, and creating channelization code blocks having the same lengths;

b) partitioning the channelization code blocks having same lengths into at least one sub-block in order to create channelization code blocks constructed in terms of individual spreading factor sets;

c) performing a convolution operation between at least one partitioned sub-block and a radio channel impulse response, and creating combined impulse responses;

d) grouping the combined impulse responses into one sub-block matrix, arranging at least one combined impulse response creating the sub-block matrix to be downshifted by an integer times a predetermined offset value, and constructing a sub-block matrix of a joint detection system matrix; and

e) arranging the sub-block matrices to be downshifted by an integer times a predetermined factor, and constructing a joint detection system matrix.

13. (Original) The method as set forth in claim 12, wherein the time slot comprises at least one area selected from a plurality of areas, a midamble area, and a GP (Guard Period) area located between prescribed time slots contained in an allocated wireless frame.

14. (Original) The method as set forth in claim 12, further comprising the step of:

f) performing addition of sub-block columns of the joint detection system matrix until the joint detection system matrix is converted into a one block-circulant squared matrix.

15. (Original) The method as set forth in claim 14, further comprising the step of:

g) adding a predetermined value to a lower end position of a received signal vector corresponding to the block-circulant squared matrix in order to provide a predetermined length equal to that of a column of the block-circulant squared matrix.

16. (Original) The method as set forth in claim 14, further comprising the step of:

h) applying a block FFT/DFT (Fast Fourier Transform / Discrete Fourier Transform) algorithm to the block-circulant squared matrix to acquire a solution of the block-circulant squared matrix.

17. (Original) The method as set forth in claim 14, further comprising the step of:

i) creating an estimated data vector associated with a joint detection element having different spreading factors by performing repetition of predetermined estimation data.

18. (Original) The method as set forth in claim 12, further comprising the steps of:

j) grouping the combined impulse responses into a sub-block matrix, arranging a number of grouped impulse responses to be downshifted by an integer times a predetermined offset valuein ascending numerical order of a specific variable, and constructing a sub-block matrix of a joint detection system matrix; and

k) arranging the sub-block matrices to be downshifted by an integer times a predetermined factor, and constructing a joint detection system matrix

19. (Original) The method as set forth in claim 18, further comprising the step of:

l) after creating the joint detection system matrix, performing addition of sub-block columns of the system matrix until the system matrix is converted into a one block-circulant squared matrix.

20. (Original) The method as set forth in claim 18, further comprising the step of:

m) adding a predetermined value to a lower end position of a received signal vector corresponding to the matrix in order to provide a predetermined length equal to that of a column of the block-circulant squared matrix.

21. (Original) The method as set forth in claim 18, further comprising the step of:

n) applying a block FFT/DFT (Fast Fourier Transform / Discrete Fourier Transform) algorithm to the block-circulant squared matrix to acquire a solution of the block-circulant squared matrix.

22. (Original) The method as set forth in claim 18, further comprising the step of:

o) creating an estimated data vector associated with a joint detection element having different spreading factors by performing repetition of predetermined estimation data.

23. (Cancelled).

24. (Cancelled).

25. (Cancelled).

26. (Cancelled).

27. (Cancelled).

28. (Original) A joint detection reception apparatus, which is utilized irrespective of a length of an orthogonal code in a TD (Time Division) - CDMA (Code Division Multiple Access) communication system, for creating a system matrix associated with a joint detection receiver in a same time slot of the TD-CDMA mobile communication system, comprising:

a channelization code generator for generating OVSFs (Orthogonal Variable Spreading factors);

a channel estimator for detecting midamble information from the received one time slot, and generating a channel impulse response using the detected midamble information; and

a joint detection unit for a) performing repetition of all channelization codes created from different bursts until a length of individual channelization code blocks is equal to a maximum spreading factor Q_{max} or a predetermined value, and creating channelization code blocks having the same lengths; b) partitioning the channelization code blocks having the same lengths into at least one sub-block in order to create the channelization code blocks constructed in terms of minimum spreading factorsof individual spreading factor sets; c) performing a convolution operation between at least one partitioned sub-block and a radio channel impulse response, and creating combined

impulse responses; d) grouping the combined impulse responses into combined impulse response sub-block matrices, arranging the combined impulse response sub-block matrices each to be downshifted by an integer times a predetermined offset value, and constructing joint detection sub-block matrices; e) arranging the M sub-block matrices to be downshifted by an integer times a predetermined offset value , and constructing a sub-block matrix of a joint detection system matrix; and f) arranging the sub-block matrices to be downshifted by an integer times a predetermined value, and constructing a joint detection system matrix.

29. (Original) The apparatus as set forth in claim 28, wherein the time slot comprises at least one area selected from a plurality of areas, a midamble area, and a GP (Guard Period) area located between prescribed time slots contained in an allocated wireless frame.

30. (Original) The apparatus as set forth in claim 28, wherein the joint detection unit, after creating the joint detection system matrix, adds sub-block columns of the system matrix until the system matrix is converted into a one block-circulant squared matrix.

31. (Original) The apparatus as set forth in claim 28, wherein the joint detection unit, after creating the block-circulant squared matrix, adds a predetermined value to a lower end position of a received signal vector corresponding to the matrix in order to provide a predetermined length equal to that of a column of the block-circulant squared matrix.

32. (Original) The apparatus as set forth in claim 28, wherein the joint detection unit applies a block FFT/DFT (Fast Fourier Transform / Discrete Fourier Transform) algorithm to the block-circulant squared matrix to acquire a solution of the block-circulant squared matrix.

33. (Original) The apparatus as set forth in claim 28, wherein the joint detection unit creates an estimated data vector associated with a joint detection element having different spreading factors by performing repetition of predetermined estimation data.

34. (Original) A joint detection reception apparatus, which is utilized irrespective of a length of an orthogonal code in a TD (Time Division) - CDMA (Code Division Multiple Access) communication system, for creating a system matrix associated with a joint detection receiver in a same time slot of the TD-CDMA mobile communication system, comprising:

a channelization code generator for generating OVSFs (Orthogonal Variable Spreading factors);

a channel estimator for detecting midamble information from the received one time slot, and generating a channel impulse response using the detected midamble information; and

a joint detection unit for a) performing repetition of all channelization codes created from different bursts until a length of individual channelization code blocks is equal to one of a maximum spreading factor and a predetermined value, and creating channelization code blocks having the same lengths; b) partitioning the channelization code blocks having the same lengths into at least one sub-block in order to create the channelization code blocks constructed in terms of individual spreading factor sets; c) performing a convolution operation between at least one partitioned sub-block and a radio channel impulse response, and creating combined impulse responses; d) grouping the combined impulse responses into one sub-block matrix, arranging a number of grouped impulse responses to be downshifted by an integer times a predetermined offset value, and constructing a sub-block matrix of a joint detection system matrix; and e) arranging the sub-block matrices to be downshifted by an integer times a predetermined factor, and constructing a joint detection system matrix.

35. (Original) The apparatus as set forth in claim 34, wherein the time slot comprises at least one area selected from a plurality of areas, a midamble area, and a GP (Guard Period) area located between prescribed time slots contained in an allocated wireless frame.

36. (Original) The apparatus as set forth in claim 34, wherein the joint detection unit, after creates the joint detection system matrix, performing addition of sub-block columns of the joint detection system matrix until the joint detection system matrix is converted into a one block-circulant squared matrix.

37. (Original) The apparatus as set forth in claim 36, wherein the joint detection unit, after creating the block-circulant squared matrix, adds a predetermined value to a lower end position of a received signal vector corresponding to the matrix in order to provide a predetermined length equal to that of a column of the block-circulant squared matrix.

38. (Original) The apparatus as set forth in claim 36, wherein the joint detection unit applies a block FFT/DFT (Fast Fourier Transform / Discrete Fourier Transform) algorithm to the block-circulant squared matrix to acquire a solution of the block-circulant squared matrix.

39. (Original) The apparatus as set forth in claim 36, wherein the joint detection unit creates an estimated data vector associated with a joint detection element having different spreading factors by performing repetition of predetermined estimation data.

40. (Original) The apparatus as set forth in claim 34, wherein the joint detection unit, after creating combined impulse responses, groups the combined impulse responses into one sub-block matrix, arranges a number of grouped impulse responses to be downshifted by an integer times a predetermined offset value in ascending numerical order of a specific variable, and constructing a sub-block matrix of a joint detection system matrix; and

arranges the sub-block matrices to be downshifted by an integer times a predetermined factor, and constructs a joint detection system matrix.

41. (Original) The apparatus as set forth in claim 40, wherein the joint detection unit, after creating the joint detection system matrix, adds sub-block columns of the system matrix until the system matrix is converted into a one block-circulant squared matrix.

42. (Original) The apparatus as set forth in claim 41, wherein the joint detection unit, after creating the block-circulant squared matrix, adds a predetermined value to a lower end position of a received signal vector corresponding to the matrix in order to provide a predetermined length equal to that of a column of the block-circulant squared matrix.

43. (Original) The apparatus as set forth in claim 41, wherein the joint detection unit applies a block FFT/DFT (Fast Fourier Transform / Discrete Fourier Transform) algorithm to the block-circulant squared matrix to acquire a solution of the block-circulant squared matrix.

44. (Original) The apparatus as set forth in claim 41, wherein the joint detection unit creates an estimated data vector associated with a joint detection element having different spreading factors by performing repetition of predetermined estimation data.